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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,399	08/27/2003	Keiichi Sato	HIRA.0122	5338
38327	7590	06/26/2007		
REED SMITH LLP 3110 FAIRVIEW PARK DRIVE, SUITE 1400 FALLS CHURCH, VA 22042			EXAMINER ALANKO, ANITA KAREN	
			ART UNIT 1765	PAPER NUMBER
			MAIL DATE 06/26/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

**Application No.**

10/648,399

**Applicant(s)**

SATO ET AL.

**Examiner**

Anita K. Alanko

**Art Unit**

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 2 and 3 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 2 and 3 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 5/10/07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

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***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 2-3 are rejected under 35 U.S.C. 102(b) as being anticipated by Gerion et al (*J. Phys. Chem. B* 2001).

Gerion discloses a method comprising the steps of:

modifying semiconductor nanoparticles (with a diameter of between 3 and 14 nm, Fig.5) with oil-soluble materials (coating by TOPO/TOP, starting materials shown in Fig.1; page 8863, “Experimental Section” part “B”) for surface modification (since the coating is on the surface of the nanoparticles);

converting the oil-soluble materials for surface modification into water-soluble materials for surface modification at the interface between an organic solvent and water (last step shown in Fig.1 the functional groups of thiol and phosphate “to tailor the nanocrystal surface functionality”, or MPA-coated nanocrystals, see page 8862, 2<sup>nd</sup> column, section labeled “Mercaptopropionic Acid-Coated Nanocrystals” ); and

shifting the semiconductor nanoparticles from an organic phase to an aqueous phase by the conversion (since they are soluble in water, p.8868, col.2, lines 15-18).

Gerion discloses to “photobrighten” the nanoparticles by irradiation of aerated solutions (page 8869, col.1, lines 41-42, 48-49), which encompasses the cited size-selective photoetching, thereby regulating particles sizes (since the solution is brightened, some particles are dissolved

and the relative monodisperse particles remain in solution) and monodispersing the semiconductor nanoparticles (since the solution is brightened). Since the same critical steps are performed in Gerion as in the instant method, the same results of dissolution of the surface of the semiconductor nanoparticles, peeling, monodispersity and conversion are inherent.

As to amended claims 2-3, Gerion discloses to irradiate with monochromatic light (488 nm laser excitation, page 8865, left column, lines 1-2) of a wavelength shorter than a wavelength of the semiconductor nanoparticles' absorption edge (as shown in Fig. 2, where the edge is about 560 nm or higher).

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 2-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gerion et al (*J. Phys. Chem. B* 2001) in view of Torimoto et al (*J Phys Chem B* 2001).

The discussion of Gerion from above is repeated here.

As to claims 2-3, Gerion does not recognize that irradiating the aerated solution causes size-selective etching. Torimoto teaches that size-selective photoetching is a useful technique for forming ultrasmall semiconductor nanoparticles (see for example, "Introduction" and "Conclusion" sections on pages 6838-6839, 6844). Torimoto teaches that the size-selective photoetching can be principally applied to the preparation of any semiconductor nanoparticles that are photocorroded under irradiation (See "Conclusion"). An advantage of obtaining select sizes is to enable the systematical investigation of size-dependent physicochemical properties (p.6858, 2<sup>nd</sup> column, lines 22-24). It would have been obvious to one with ordinary skill in the art to use size selective photoetching, thereby regulating particle sizes, monodispersing them, peeling and converting the materials for surface modification, in the method of Gerion because Torimoto teaches that it is a useful technique for forming small semiconductor nanoparticles.

#### ***Terminal Disclaimer***

The terminal disclaimer filed on 3/29/07 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of 6,911,082 B2 has been reviewed and is accepted. The terminal disclaimer has been recorded.

#### ***Response to Amendment***

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Claims 2-3 remain rejected under 35 U.S.C. 102(b) as being anticipated by Gerion et al (*J. Phys. Chem. B* 2001), and rejected under 35 U.S.C. 103(a) as being unpatentable over Gerion et al (*J. Phys. Chem. B* 2001) in view of Torimoto et al (*J Phys Chem B* 2001).

The double patenting rejection is withdrawn since the terminal disclaimer has been submitted and is accepted.

### ***Response to Arguments***

Applicant's arguments filed 3/29/07 have been fully considered but they are not persuasive to the extent they still apply.

Applicant argues that only larger sized semiconductor nanoparticles are photoexcited and dissolved, and thus only smaller sized semiconductor nanoparticles are sorted. In response, since Gerion also irradiates as cited, Gerion also has only large sized nanoparticles photoexcited and dissolved, and smaller sized particles sorted.

Applicant argues that Gerion does not show or suggest either explicitly or implicitly about the wavelength. Examiner disagrees since laser irradiation is used, at wavelengths less than the edge shown in Figure 2.

Applicant argues about photobrightening and photoetching. Examiner repeats the arguments from the previous office action.

Examiner notes that the irradiation steps are cited in a "wherein" clause, and do not require, for example, an active step of predetermining wavelength irradiated, time irradiated, environment, repetition of steps, etc., based on a corresponding desired end-result, i.e.,

monodispersed size. Thus, Gerion, who does not recognize the advantage of photoetching reads on the claimed invention.

Applicant argues about the desirability to combine Gerion and Torimoto. In response, the desirability to combine is that Torimoto teaches that photoetching can be used for any nanoparticle, and obtaining selective sizes, i.e. monodisperse, is desirable to tailor the physicochemical properties.

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anita K. Alanko whose telephone number is 571-272-1458. The examiner can normally be reached on Mon-Fri until 2:30 pm (Wed until 11:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*Anita K. Alanko*  
Anita K Alanko  
Primary Examiner  
Art Unit 1765